DLM Mathematics Year End Blueprint
Approved by States – May 2014

This document describes recommendations for the contents of the mathematics Year-End only (YE) test blueprint for DLM. In each elementary and middle school grade (grades 3-8), a collection of Essential Elements (EEs) is suggested with varying numbers of items per EE recommended. The number of items per of EE was determined using a combination of processes for prioritizing EEs within and across the grades. The principles that guided the development of this blueprint were:

- Use the Learning Map to prioritize content that has the potential to maximize student growth in academic skills across grades.
- Use knowledge of academic content and instructional methods to prioritize content that is considered important by stakeholders and central to the construct
- Prioritize content that can be applied to real-world or workplace problems.
- Indicate heavier testing of essential skills when students have had adequate opportunity to learn, that is, not at the beginning of a developmental pathway, but instead when the concepts or skills represent significant steps within or the culmination of a particular learning pathway.
- Maximize the breadth of coverage of EEs, given the time needed to administer an assessment to students in the alternate assessment population.

In response to feedback from DLM States and the TAC collected prior to March 2014, the breadth of EEs to be assessed in the blueprint was broadened. Also, in response to the needs of DLM States, there are now separate blueprints by grade for three years in high school, identifying the specific content to be assessed at each grade. This document includes an improved explanation of the thought processes used when making decisions about EEs and number of items to prioritize throughout the blueprint.

The Mathematics EEs are arranged into the four claims and nine conceptual areas shown in Table 1.

Table 1. Mathematics Claims and Conceptual Areas.

Major Claims	Conceptual Areas	
Students demonstrate increasingly complex understanding of number sense.	M.C1.1	Understand number structures (counting, place value, fraction)
	M.C1.2	Compare, compose, and decompose numbers and sets
	M.C1.3	Calculate accurately and efficiently using simple arithmetic operations
Students demonstrate increasingly complex spatial reasoning and understanding of geometric principles.	M.C2.1	Understand and use geometric properties of two- and three-dimensional shapes
	M.C2.2	Solve problems involving area, perimeter, and volume
Students demonstrate Increasingly complex understanding of measurement, data, and analytic procedures.	M.C3.1	Understand and use measurement principles and units of measure
	M.C3.2	Represent and interpret data displays
Students solve increasingly complex mathematical problems, making productive use of algebra and functions.	M.C4.1	Use operations and models to solve problems
	M.C4.2	Understand patterns and functional thinking

Blueprint

In response to feedback collected previously from the states and the TAC, the YE blueprint contains adequate EEs to insure breadth of coverage, while recommending a limited number of items per EE so that the YE test would not need to be excessively long. Specifically, in each grade, the recommended blueprint addresses all four claims and each conceptual area (CA) relevant to the grade. All but a few EEs are included in the blueprint, excluding only those EEs that are very difficult to represent in a computer based assessment (CBA) environment. In addition to implementing the guidelines listed above, the recommendations for the mathematics blueprint reflect our attempt to streamline the assessment across the grades to:

- Avoid unnecessary redundancy in what is tested from year to year
- Highlight concepts and skills that provide students power for future mathematical learning during and beyond school
- Acknowledge mathematical learning trajectories that connect the EEs over the course of several grades

Table 2 shows the number of EEs by grade and CA recommended for inclusion in the blueprint for grades 3 through 8. Note that not all grades have EEs in all nine conceptual areas.

Table 2. Number of EEs per Conceptual Area in the Mathematics YE Blueprint for Grades 3 – 8 (1/4 indicates the blueprint contains 1 of 4 EEs in a grade and CA combination.)

Grade	Conceptual Area									Total
	C1.1	C1.2	C1.3	C2.1	C2.2	C3.1	C3.2	C4.1	C4.2	
3	3/4		1/1	0/1	1/1	2/3	1/1	2/2	1/1	11/14
4	2/2	2/2	1/1	3/4	1/2	3/5	1/2	2/3	1/1	16/22
5	2/2	3/4	2/2	2/2	1/1	3/3	1/1		1/1	15/16
6	1/1	2/2	2/2		2/2		1/2	3/3		11/12
7	2/2	1/1	3/3	3/4	1/2		2/3	1/2	1/1	14/18
8	1/1	1/2	2/2	4/4	1/1		1/1	1/1	3/5	14/17

NOTE: Cells filled with black lines represent grades with no EEs assigned to the CA.

The mathematics EEs for high school are not divided into grades or courses, permitting multiple options for arranging the EEs into coherent mathematics courses, such as courses focused on either algebra or geometry, or integrated courses that include elements of algebra together with elements of geometry. In this document the mathematics high school EEs are organized into three integrated mathematics courses: Math 9, Math 10, and Math 11. All of the EEs except two are each assigned to one of the three grade-level integrated mathematics courses. Two high school EEs are not included in any of the recommendations due to difficulties in representing them in the CBA environment while maintaining the intent of the EE. Students in any year of high school could work with content for EEs outside of their assigned grades through the instructionally embedded assessment. Table 3 shows the number of EEs by grade and CA recommended for inclusion on the YE blueprint for grades 9 – 11. Note that not all grades have EEs in all nine conceptual areas.

Table 3. Number of EEs per Conceptual Area in the Mathematics YE Blueprints for HS courses – Math 9, Math 10, and Math 11. The number in each cell indicates the number of EEs in that CA for that course.

Course	Conceptual Area									Total N of EEs
	C1.1	C1.2	C1.3	C2.1	C2.2	C3.1	C3.2	C4.1	C4.2	
Math 9			3	2	1	0	0	2	0	8
Math 10			1	1	0	1	2	2	2	9
Math 11			2	1	0	0	1	0	5	9
N of EEs in CA	0	0	6	5	2	1	3	4	7	26/28

NOTE: Cells filled with black lines represent grades with no EEs assigned to the CA.

Some states have inquired about the extent to which any one of the high school grade level tests could be used as a one-time high school assessment. The high school Essential Elements are defined for the high school grade band (grades 9-12) as a whole. When defining the blueprint for the high school grades, the EEs were assigned one by one to grades 9, 10, and 11. Since the HS EEs do not contain much overlapping content, each grade level blueprint describes a different portion of the mathematical knowledge described in the HS EEs. Therefore, any selection of fewer than the three grade level tests would result in an incomplete assessment of students' knowledge and abilities related to the full set of HS EEs. Some considerations that could be used to inform decisions about which HS assessments to choose when fewer than all three will be required are:

- The Math 9 blueprint most directly relates to the Grade 8 blueprint.
- The Math 10 and Math 11 blueprints each relate directly to the Math 9 test. If a state does not require the Math 9 test, and a teacher does not teach the EEs assigned to the Math 9 test, then students may have gaps in their knowledge, causing them to be unprepared to learn the content described in the EEs assigned to the Math 10 or Math 11 tests.
- The Math 11 test will not provide data that can be used to describe students' knowledge of EEs assigned to the previous grade level tests.
- Responses to the Math 9 and Math 10 tests together may be able to predict performance on the Math 11 test.[1]
- All of these recommendations pertain most directly to students operating at the target level of performance. Relationships among EEs at and across high school grades may vary for intitial precursor, distal precursor, proximal precursor, and successor levels. Once the blueprint is finalized, the mathematics content team will analyze these relationships more closely and provide more detailed information about how EEs may be arranged together on testlets.

Guiding principles. The next paragraphs provide some description and examples of four principles we used when making decisions about how to represent the EEs in the blueprint. It is important to recognize that these principles were not implemented as rules, but as guidelines for our thinking about priorities within and across the grades. In most cases, our decisions simultaneously satisfied most of the principles, while in selected cases, it was not possible to satisfy all four principles with the same decision. In particular, *allowing for opportunity to learn* before testing and *identifying gateways* to prevent students from having insurmountable gaps in their knowledge were difficult to satisfy simultaneously. However, when these cases were considered, looking to *avoiding redundancy* and *acknowledging trajectories* assisted our thinking.

[1] Will require research to confirm predictive value of the 9th and 10th grade tests.

Allow for opportunity to learn. Concepts and skills are prioritized (i.e., represented by more items) at points when students have had adequate opportunity to learn rather than when they first appear in the EEs. An example of an EE that represents the beginning of a developmental learning pathway from C2.1 is 3.G.1, "Describe attributes of two-dimensional shapes." This EE, while clearly instructionally relevant and critical for future work with shapes, is a very early EE concerning attributes of shapes and is represented by more items at a subsequent grade level, after students have had ample opportunity to learn about attributes and shapes, in conjunction with 5.G.1-4, "Sort two-dimensional figures and identify the attributes (angles, number of sides, corners, color) they have in common." In making this decision, we acknowledged the trajectory extending from grade 3 through grade 5, consistent with the van Hiele model (Crowley, 1987), in which students first describe attributes of two-dimensional shapes in grade 3, then describe defining attributes of two-dimensional shapes in grade 4, and finally sort shapes and identify the attributes they have in common in grade 5.

Identify gateways. Skills that provide students power to learn essential mathematics in subsequent grades or courses are prioritized in cases where if students lacked that knowledge, their progress would be impeded. An example of an EE that provides an essential foundation is 4.NF.1-2, "Identify models of one half (1/2) and one fourth (1/4)." Students need to learn about and understand unit fractions before tackling non-unit fractions, which is prioritized in 5.NF.2, "Identify models of thirds and tenths." Consequently, EEs that represent essential foundations for content at subsequent grades are prioritized in the blueprint. When considering this decision, we not only acknowledged the trajectory related to fractions and decimals extending from grade 3 through grade 8, but we also considered the importance of conceptual foundations for fractions. We know from the literature on this topic that far too many students rely on their understanding of whole numbers when first learning to operate with fractions (Lamon, 2012). Students who do not develop sufficient conceptual understanding of the meaning of fractions and wholes often struggle subsequently to understand why operations with fractions produce different results than operations with whole numbers. For example, multiplying two whole numbers results in a bigger number, but multiplying a fraction less than one by a whole number results in a number smaller than the whole number. By prioritizing the identification of models of unit fractions, we intend to influence instruction to include modeling of fractional amounts early in elementary school, i.e. conceptual work with fractions and wholes, well in advance of operations with fractions.

Avoid redundancy. As noted above and shown in Table 2 and Table 3, the blueprint recommendations for each grade both individually and collectively achieve breadth of content coverage by addressing all four claims and at least six of the nine conceptual areas (CAs). In our efforts to achieve breadth, we aim to avoid heavily testing very similar skills in sequential grades. While some repetition is appropriate for instruction, EEs that include content very similar to content at surrounding grades are considered redundant, and one rather than both are represented by multiple items blueprint. Example EEs from C1.3 at neighboring grades that are somewhat redundant are 5.NBT.5, "Multiply whole numbers up to 5x5" and 6.NS.3, "Solve two-factor multiplication problems with products up to 50," In light of the trajectory leading up to 7.NS.2.b, "Solve division problems with divisors up to five and also with a divisor of 10 without remainders," multiplication was prioritized in grade 5, preparing conceptually to divide was prioritized in grade 6, (6.NS.2 "Apply the concept of fair shares and equal shares to divide"), and working division problems (7.NS.2.b) was prioritized in grade 7.

Acknowledge learning trajectories. Some EEs prioritized in the blueprint represent important steps in particular learning trajectories that unfold over several years of experience and instruction. For

example, several EEs in conceptual area C1.3 form a pathway around arithmetic operations and problem solving. These EEs describe students learning arithmetic operations in elementary grades, gradually increasing the range of numbers with which they can work through the middle grades, and culminating with solving real world problems using all four arithmetic operations in high school. Another example is seen in conceptual area C4.2, which includes EEs that form a pathway around the development of functional thinking. These EEs describe students recognizing and extending simple patterns in the elementary grades, working with and graphing simple ratios in the middle grades, and working with representations of linear functions in high school.

Detailed Blueprints

In the pages that follow, the EEs for each grade are listed in tables. Each EE is marked by "Yes" or "No" to indicate whether it is recommended for inclusion in the blueprint. For each EE marked with a "yes" for the blueprint, the anticipated number of items is included in the next column. Rationale statements are included for EEs that are not recommended for inclusion in the blueprint. Supporting statements for why selected EEs are recommended for inclusion in the blueprint are also provided. In most cases, relationships to other EEs are provided for easy reference.

Grade 3 Mathematics					
EE	**Description**	**Conceptual Area**	**Tested**	**Number of Items (30)**	**Rationale**
3.NBT.1	Use decade numbers (10, 20, 30) as benchmarks to demonstrate understanding of place value for numbers 0-30.	M.C1.1	No	0	Encompassed by 3.NBT.2; rounding to tens is tested explicitly at 4th grade by 4.NBT.3.
3.NBT.2	Demonstrate understanding of place value to tens.	M.C1.1	Yes	1	Place value has little meaning for ones; rounding is tested again at 4th grade by 4.NBT.3.
3.NBT.3	Count by tens using models such as objects, base ten blocks, or money.	M.C1.1	Yes	1	Tested in conjunction with repeated addition; see 3.OA.1-2.
3.NF.1-3	Differentiate a fractional part from a whole.	M.C1.1	Yes	3	Essential for understanding fractions in subsequent grades. Coordinates well with shapes partitioned into equal areas.
3.OA.4	Solve addition and subtraction problems when result is unknown, limited to operands and results within 20.	M.C1.3	Yes	6	Emphasizes basic computation.
3.G.1	Describe attributes of two-dimensional shapes.	M.C2.1	No	0	Tested in subsequent grades when recognizing and classifying shapes based on their defining attributes; see 4.G.1 and 5.G.1-4.
3.G.2	Recognize that shapes can be partitioned into equal areas.	M.C2.2	Yes	3	Essential for understanding fractions in subsequent grades.
3.MD.1	Tell time to the hour on a digital clock.	M.C3.1	Yes	1	Limited value in terms of relationships to future growth in the EEs.
3.MD.2	Identify the appropriate measurement tool to solve one-step word problems involving mass and volume.	M.C3.1	No	0	Tested in 4th grade when students measure mass and volume with standard tools; see 4.MD.2.b.
3.MD.4	Measure length of objects using standard tools, such as rulers, yardsticks, and meter sticks	M.C3.1	Yes	3	Basic measurement principles with concrete examples of length. Items will be restricted to inches and feet to provide greatest accessibility.
3.MD.3	Use picture or bar graph data to answer questions about data.	M.C3.2	Yes	3	Reinforces addition and repeated addition but in a different mathematical representation.
3.OA.1-2	Use repeated addition to find the total number of objects and determine the sum.	M.C4.1	Yes	3	Draws on skip counting and addition, and prepares students for multiplication. Incorporates items for skip counting by tens, i.e., 3.NBT.2.
3.OA.8	Solve one-step real world problems using addition or subtraction within 20.	M.C4.1	Yes	1	Focus on addition and subtraction skills in 3rd grade. Problem solving tested again in 4th grade; see 4.OA.3.
3.OA.9	Identify arithmetic patterns.	M.C4.2	Yes	3	Essential foundations for functional reasoning.

Grade 4 Mathematics					
EE	**Description**	**Conceptual Area**	**Tested**	**Number of Items (30)**	**Rationale**
4.NF.1-2	Identify models of one half (1/2) and one fourth (1/4).	M.C1.1	Yes	3	Extends understanding of fraction vs. whole from 3rd grade and prepares for thirds, fourths, and tenths in subsequent grades. Also this focus on unit fractions early on provides a solid foundation for other fractions generally.
4.NF.3	Differentiate between whole and half.	M.C1.1	Yes	1	Encompassed in items for 4.NF.1-2 and also tested in 3rd grade when differentiating fractional parts from wholes, i.e., 3.NF.1-3.
4.NBT.2	Compare whole numbers to 10 using symbols (<, >, =).	M.C1.2	Yes	1	First expectation to use comparison symbols; tested again in 5th grade with numbers up to 100; see 5.NBT.3.
4.NBT.3	Round any whole number 0-30 to the nearest ten.	M.C1.2	Yes	3	Requires knowledge of place value and comparison.
4.NBT.4	Add and subtract two-digit whole numbers.	M.C1.3	Yes	1	Encompassed in problem solving items for 4.OA.3.
4.G.1	Recognize parallel lines and intersecting lines.	M.C2.1	Yes	2	Important for understanding the defining attributes (rather than merely visual recognition of prototypes) of squares and rectangles, which is tested in 5th grade; see 5.G.1-4.
4.G.2	Describe the defining attributes of two-dimensional shapes.	M.C2.1	No	0	Tested in 5th grade when classifying shapes based on their defining attributes; see 5.G.1-4.
4.MD.5	Recognize angles in geometric shapes.	M.C2.1	Yes	1	Identifying angles is also encompassed in items for 4.MD.6.
4.MD.6	Identify angles as larger and smaller.	M.C2.1	Yes	2	Prepares students for identifying and comparing acute, right, and obtuse angles, tested in subsequent grades; see 7.G.5, 8.G.5.
4.G.3	Recognize that lines of symmetry partition shapes into equal areas.	M.C2.2	No	0	Tested to some extent in 3rd grade with shapes partitioned into equal areas; see 3.G.2. This property of symmetry and equal areas has little relationship to subsequent EEs.
4.MD.3	Determine the area of a square or rectangle by counting units of measure (unit squares).	M.C2.2	Yes	3	Critical conceptual foundations for area and volume.

EE	Description	Conceptual Area	Tested	Number of Items	Rationale
4.MD.1	Identify the smaller measurement unit that comprises a larger unit within a measurement system (inches/foot, centimeter/meter, minutes/hour).	M.C3.1	No	0	Little relationship to other EEs because they do not include unit conversions or equivalent fractions.
4.MD.2.a	Tell time using a digital clock. Tell time to the nearest hour using an analog clock.	M.C3.1	Yes	1	Limited value in terms of relationships to future growth in the EEs.
4.MD.2.b	Measure mass or volume using standard tools.	M.C3.1	Yes	3	Extends previous work measuring lengths and introduces practical skills for life and work.
4.MD.2.c	Use standard measurement to compare lengths of objects.	M.C3.1	No	0	Tested in 5th grade when measuring lengths using standard tools; see 5.MD.1.b.
4.MD.2.d	Identify coins (penny, nickel, dime, quarter) and their values.	M.C3.1	Yes	1	Limited value in terms of relationships to future growth in the EEs.
4.MD.4.a	Represent data on a picture or bar graph given a model and a graph to complete.	M.C3.2	No	0	Excellent for instruction; Tested in more receptive ways by interpreting data from graphs at 4th grade and creating graphs in 5th grade; see 4.MD.4.b and 5.MD.2.
4.MD.4.b	Interpret data from a picture or bar graph.	M.C3.2	Yes	3	Reinforces understanding of graphs as well as comparison of numbers, addition, repeated addition, and subtraction.
4.OA.1-2	Demonstrate the connection between repeated addition and multiplication.	M.C4.1	Yes	1	Tested again with multiplication in 5th grade; see 5.NBT.5.
4.OA.3	Solve one-step real-world problems using addition or subtraction within 100.	M.C4.1	Yes	3	Encompasses addition and subtraction skills in the context of problem solving. Recall problem solving is not prioritized in 3rd grade, but computation is.
4.OA.4	Show one way to arrive at a product.	M.C4.1	No	0	Important for instruction but somewhat loosely defined for testing. Multiplication is tested in 5th grade; see 5.NBT.5.
4.OA.5	Use repeating patterns to make predictions.	M.C4.2	Yes	1	Tested again in 5th grade when identifying and extending numerical pattern; see 5.OA.3.

Grade 5 Mathematics					
EE	**Description**	**Conceptual Area**	**Tested**	**Number of Items (30)**	**Rationale**
5.NF.1	Identify models of halves (1/2, 2/2) and fourths (1/4, 2/4, 3/4, 4/4).	M.C1.1	Yes	1	Encompassed in items for 4.NF.1-2 and 5.NF.2.
5.NF.2	Identify models of thirds (1/3, 2/3, 3/3) and tenths (1/10, 2/10, 3/10, 4/10, 5/10, 6/10, 7/10, 8/10, 9/10, 10/10).	M.C1.1	Yes	3	Expands understanding of fractions from unit fractions, which is tested in 4th grade, to non-unit fractions. Lays foundation for ratios and decimals. SEE 4.NF.1-2, 6.NS.1, 7.RP.1-3, 7.NS.1, 8.NS.1, 7.NS.3, 8.NS.2.b.
5.NBT.1	Compare numbers up to 99 using base ten models.	M.C1.2	Yes	1	Encompassed in items for 5.NBT.3
5.NBT.2	Use the number of zeros in numbers that are powers of 10 to determine which values are equal, greater than, or less than.	M.C1.2	No	0	Little relationship to future growth in the EEs.
5.NBT.3	Compare whole numbers up to 100 using symbols (<, >, =).	M.C1.2	Yes	3	Encompasses 4.NBT.2 and 5.NBT.1.
5.NBT.4	Round two-digit whole numbers to the nearest 10 from 0—90.	M.C1.2	Yes	1	Tested up to 30 in 4th grade, and the rules for rounding do not change materially between 30 and 90; see 4.NBT.3.
5.NBT.5	Multiply whole numbers up to 5x5.	M.C1.3	Yes	3	Builds on addition and repeated addition from earlier grades and expands students' power with number operations.
5.NBT.6-7	Illustrate the concept of division using fair and equal shares.	M.C1.3	Yes	1	Tested again in 6th grade when applying the concept of fair and equal shares to divide; see 6.NS.2.
5.G.1-4	Sort two-dimensional figures and identify the attributes (angles, number of sides, corners, color) they have in common.	M.C2.1	Yes	3	Focus on defining attributes of shapes and distinguishing defining from non-defining attributes.
5.MD.3	Identify common three-dimensional shapes.	M.C2.1	Yes	1	Tested again in 7th grade when matching similar shapes; see 7.G.1.
5.MD.4-5	Determine the volume of a rectangular prism by counting units of measure (unit cubes).	M.C2.2	Yes	3	Builds on conceptual understanding of area, which is tested in 4th grade, and lays foundation for estimating volume and calculating volume using a formula; see 4.MD.3, 6.G.2, and 8.G.9.
5.MD.1.a	Tell time using an analog or digital clock to the half or quarter hour.	M.C3.1	Yes	1	Limited value in terms of relationships to future growth in the EEs.

EE	Description	Conceptual Area	Tested	Number of Items	Rationale
5.MD.1.b	Use standard units to measure weight and length of objects.	M.C3.1	Yes	3	Builds on concrete experiences with measurement and prepares students for problem solving measurement contexts; see 3.MD.4, 4.MD.2.b, 6.G.1, and 6.G.2.
5.MD.1.c	Indicate relative value of collections of coins.	M.C3.1	Yes	1	Limited value in terms of relationships to future growth in the EEs.
5.MD.2	Represent and interpret data on a picture, line plot, or bar graph.	M.C3.2	Yes	2	Excellent for instruction and partially tested using teacher observation items where students construct graphical representations of data. These and other items will also address interpretations of data in graphical displays.
5.OA.3	Identify and extend numerical patterns.	M.C4.2	Yes	3	Draws on untested material in 4th grade and prepares students for rates and functional reasoning; see 4.OA.5, 8.F.1-3, 8.F.4, F-IF.1-3.

Grade 6 Mathematics					
EE	**Description**	**Conceptual Area**	**Tested**	**Number of Items (30)**	**Rationale**
6.RP.1	Demonstrate a simple ratio relationship.	M.C1.1	Yes	1	Tested again in 7th grade when using ratios to model numerical relationships; see 7.RP.1-3.
6.NS.1	Compare the relationships between two unit fractions.	M.C1.2	Yes	3	Reinforces understanding between division and fractions; essential foundation for decimals, ratios, and probability; see 6.RP.1, 7.RP.1-3, 7.NS.3, 7.SP.5-7, 8.NS.2.b, S-IC.1-2.
6.NS.5-8	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero).	M.C1.2	Yes	3	Expands the range of numbers for working with algebraic equations and opens up more realistic contexts for problem solving, including debt and temperature.
6.NS.2	Apply the concept of fair share and equal shares to divide.	M.C1.3	Yes	4	Reinforces the concept of equal groups in multiplication and lays the foundation for division, which is tested in 7th grade; see 7.NS.2.a and 7.NS.2.b.
6.NS.3	Solve two-factor multiplication problems with products up to 50 using concrete objects and/or a calculator.	M.C1.3	Yes	1	Also tested in 5th; see 5.NBT.5.
6.G.1	Solve real-world and mathematical problems about area using unit squares.	M.C2.2	Yes	3	Problem solving in geometry using figures and manipulatives provides opportunities to work with concrete and pictorial representations of mathematics.
6.G.2	Solve real-world and mathematical problems about volume using unit cubes.	M.C2.2	Yes	3	Problem solving in geometry using figures and manipulatives provides opportunities to work with concrete and pictorial representations of mathematics.
6.SP.1-2	Display data on a graph or table that shows variability in the data.	M.C3.2	No	0	Constructing graphs is tested in 5th grade; see 5.MD.2. Interpreting distributions in 6.SP.5 encompasses similar understanding as this EE.
6.SP.5	Summarize data distributions shown in graphs or tables.	M.C3.2	Yes	3	In previous grades students may focus on individual data points or single groups of data. This EE provides the opportunity to make sense of (analyze and synthesize) an entire problem using a data display.

EE	Description	Conceptual Area	Tested	Number of Items	Rationale
6.EE.1-2	Identify equivalent number sentences.	M.C4.1	Yes	4	Lays the foundation for recognizing or creating equivalent number sentences using properties of operations, which is tested in 7th grade; see 7.EE.1. Lays the foundation for solving algebraic equations, see 7.EE.4, and 8.EE.7. Items include examples reflecting properties of addition, thereby encompassing understanding of 6.EE.3.
6.EE.3	Apply the properties of addition to identify equivalent numerical expressions.	M.C4.1	Yes	1	Encompassed in items for 6.EE.1-2.
6.EE.5-7	Match an equation to a real-world problem in which variables are used to represent numbers.	M.C4.1	Yes	4	Introduces symbols as variables that represent quantities in equations used to solve real world problems; see A-CED.1. Expands the set of representations available to students for describing numerical relationships and real world problems.

Grade 7 Mathematics					
EE	**Description**	**Conceptual Area**	**Tested**	**Number of Items (30)**	**Rationale**
7.NS.2.c-d	Express a fraction with a denominator of 10 as a decimal.	M.C1.1	Yes	1	Tested again in 8th grade; see 8.NS.2.b.
7.RP.1-3	Use a ratio to model or describe a relationship.	M.C1.1	Yes	3	Lays foundation for rate and slope, which are tested in 8th grade and HS; see 8.F.1-3, F-BF.1, and A-REI.10-12.
7.NS.3	Compare quantities represented as decimals in real world examples to tenths.	M.C1.2	Yes	1	Tested again in 8th grade; see 8.NS.2.b
7.NS.1	Add fractions with like denominators (halves, thirds, fourths, and tenths) with sums less than or equal to one.	M.C1.3	Yes	3	Understanding fractions generally is tested in 4th and 5th grades, see 4.NF.1-2, 5.NF.1, and 5.NF.2. This EE adds simple addition operations with fractions. Items are restricted to like denominators.
7.NS.2.a	Solve multiplication problems with products to 100	M.C1.3	Yes	1	Multiplication is tested directly in 5th grade and again in 8th grade, when applying the area formula for rectangles; see 5.NBT.5 and 8.G.9.
7.NS.2.b	Solve division problems with divisors up to five and also with a divisor of 10 without remainders	M.C1.3	Yes	3	First opportunity to test division symbolically.
7.G.1	Match two similar geometric shapes that are proportional in size and in the same orientation.	M.C2.1	Yes	3	First opportunity to test understanding of similarity, which builds on understanding of defining attributes and sameness; see 5.G.1-4.
7.G.2	Recognize geometric shapes with given conditions.	M.C2.1	Yes	1	Encompassed in items for 7.G.1
7.G.3	Match a two-dimensional shape with a three-dimensional shape that shares an attribute.	M.C2.1	No	0	Excellent for instruction to reinforce names of shapes and form connections between 2D and 3D shapes, but very difficult to represent in the computer display without undue abstraction in the images.
7.G.5	Recognize angles that are acute, obtuse, and right.	M.C2.1	Yes	3	Essential for identifying, describing, and comparing different types of geometric figures; see 8.G.1, 8.G.2, 8.G.5, and G-MG.1-3.

EE	Description	Conceptual Area	Tested	Number of Items	Rationale
7.G.4	Determine the perimeter of a rectangle by adding the measures of the sides.	M.C2.2	Yes	3	Understanding of perimeter grows out of understanding and measuring lengths and translates easily into practical life and work skills; see 3.MD.4, 5.MD.1.b, 8.G.9, and G-GPE.7.
7.G.6	Determine the area of a rectangle using the formula for length x width, and confirm the result using tiling or partitioning into unit squares.	M.C2.2	No	0	Calculating area using a formula is tested in 8th grade; see 8.G.9.
7.SP.1-2	Answer a question related to the collected data from an experiment, given a model of data, or from data collected by the student.	M.C3.2	No	0	Excellent for instruction. Interpreting data and data displays is tested at previous grades and again in HS; see 4.MD.4.b, 5.MD.2, 6.SP.5, 7.SP.5, 8.SP.4, and S-ID.1-2.
7.SP.3	Compare two sets of data within a single data display such as a picture graph, line plot, or bar graph.	M.C3.2	Yes	3	Expands interpretations to two sets of data, whereas previous grade EEs focused on single sets of data; see 4.MD.4.b, 5.MD.2, 6.SP.5, 7.SP.5, 8.SP.4, and S-ID.1-2.
7.SP.5-7	Describe the probability of events occurring as possible or impossible.	M.C3.2	Yes	1	Few relationships to subsequent EEs. Lays foundation for material in the 3rd year of the HS blueprint.
7.EE.1	Use the properties of operations as strategies to demonstrate that expressions are equivalent.	M.C4.1	Yes	3	Builds on the 6th grade EE about identifying equivalent number sentences; see 6.EE.1-2. Prepares students for solving algebraic equations; see 8.EE.7,and A-CED.1.
7.EE.4	Use the concept of equality with models to solve one-step addition and subtraction equations	M.C4.1	No	0	Tested in 8th grade when solving simple algebraic equations using addition and subtraction; see 8.EE.7. The use of models is quite appropriate for instruction and difficult to represent digitally.
7.EE.2	Identify an arithmetic sequence of whole numbers with a whole number common difference.	M.C4.2	Yes	1	Few real world connections beyond identifying this type of pattern, which is tested in earlier grades. Lays foundation for material in the 3rd year of the HS blueprint.

Grade 8 Mathematics					
EE	**Description**	**Conceptual Area**	**Tested**	**Number of Items (30)**	**Rationale**
8.NS.2.a	Express a fraction with a denominator of 100 as a decimal.	M.C1.1	Yes	1	Encompassed in items for 8.NS.2.b.
8.EE.3-4	Compose and decompose whole numbers up to 999.	M.C1.2	No	0	Little relationship to future growth in the EEs.
8.NS.2.b	Compare quantities represented as decimals in real-world examples to hundredths.	M.C1.2	Yes	3	Encompasses understanding of 7.NS.2.c-d, 7.NS.3, 8.NS.2.a, and 8.NS.2.b.
8.EE.1	Identify the meaning of an exponent (limited to exponents of 2 and 3).	M.C1.3	Yes	1	Little relationship to future growth in the EEs. Lays foundation for material in the 3rd year of the HS blueprint.
8.NS.1	Subtract fractions with like denominators (halves, thirds, fourths, and tenths) with minuends less than or equal to one.	M.C1.3	Yes	3	Important for working with algebraic equations and rates; see F-BF.1 and A-REI.10-12.
8.G.1	Recognize translations, rotations, and reflections of shapes.	M.C2.1	Yes	3	Transformations of shapes relate to a myriad of real world scenarios and provide access to solving practical problems; see G-MG.1-3.
8.G.2	Identify shapes that are congruent.	M.C2.1	Yes	1	Similarity is tested in 7th grade; see 7.G.1. Congruent shapes are tested in 8.G.1.
8.G.4	Identify similar shapes with and without rotation.	M.C2.1	Yes	1	Similarity is tested in 7th grade; see 7.G.1. Rotations are tested in 8.G.1.
8.G.5	Compare any angle to a right angle and describe the angle as greater than, less than, or congruent to a right angle.	M.C2.1	Yes	1	Acute, right, and obtuse angles are also tested in 7th grade; see 7.G.5.
8.G.9	Use the formulas for perimeter, area, and volume to solve real-world and mathematical problems (limited to perimeter and area of rectangles and volume of rectangular prisms).	M.C2.2	Yes	3	Culmination of many years of work measuring geometric shapes and their properties.
8.SP.4	Construct a graph or table from given categorical data and compare data categorized in the graph or table.	M.C3.2	Yes	3	Extends the reasoning tested at previous grades to include comparisons among multiple groups represented in a graph; prerequisite for S-ID.1-2.
8.EE.7	Solve simple algebraic equations with one variable using addition and subtraction.	M.C4.1	Yes	3	Solving simple equations provides the potential to solve many types of real-world problems; see N-CN.2.b and N-CN.2.c.

EE	Description	Conceptual Area	Tested	Number of Items	Rationale
8.EE.2	Identify a geometric sequence of whole numbers with a whole number common ratio.	M.C4.2	Yes	1	Little relationship to future growth in the EEs and relatively abstract. Lays foundation for material in the 3rd year of the HS blueprint.
8.EE.5-6	Graph a simple ratio by connecting the origin to a point representing the ratio in the form of y/x. For example, when given a ratio in standard form (2:1), convert to 2/1, and plot the point (1, 2).	M.C4.2	No	0	Excellent for instruction. Encompassed in items for two HS EEs related to equations and functions; see F-BF.1 and A-REI.10-12.
8.F.1-3	Given a function table containing at least 2 complete ordered pairs, identify a missing number that completes another ordered pair (limited to linear functions).	M.C4.2	Yes	3	Represents working with functions using a numerical and tabular representation. Graphical and symbolic representations are tested in HS; see F-BF.1 and A-REI.10-12.
8.F.4	Determine the values or rule of a function using a graph or a table.	M.C4.2	Yes	1	Essential skill that represents preliminary functional reasoning. Tested again in HS; see F-IF.1-3, A-REA.10-12.
8.F.5	Describe how a graph represents a relationship between two quantities.	M.C4.2	No	3	Expressive and tested in HS; see F-IF.1-3, A-REA.10-12.

High School Mathematics Overview						
EE	**Description**	**Conceptual Area**	**Math 9 (30)**	**Math 10 (30)**	**Math 11 (30)**	**Rationale***
N-CN.2.a	Use the commutative, associative, and distributive properties to add, subtract, and multiply whole numbers.	M.C1.3	3			
N-CN.2.b	Solve real-world problems involving addition and subtraction of decimals, using models when needed.	M.C1.3	4			
N-CN.2.c	Solve real-world problems involving multiplication of decimals and whole numbers, using models when needed.	M.C1.3	3			
N-RN.1	Determine the value of a quantity that is squared or cubed.	M.C1.3			4	
S-CP.1-5	Identify when events are independent or dependent.	M.C1.3		3		
S-IC.1-2	Determine the likelihood of an event occurring when the outcomes are equally likely to occur.	M.C1.3			3	
G-CO.1	Know the attributes of perpendicular lines, parallel lines, and line segments; angles, and circles.	M.C2.1	5			
G-CO.4-5	Given a geometric figure and a rotation, reflection, or translation of that figure, identify the components of the two figures that are congruent.	M.C2.1		3		
G-CO.6-8	Identify corresponding congruent and similar parts of shapes.	M.C2.1			3	
G-GMD.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects.	M.C2.1			✖	Excellent for instruction. Very difficult to represent in CBA environment without undue abstraction in the images.
G-MG.1-3	Use properties of geometric shapes to describe real-life objects.	M.C2.1	3			
G-GMD.1-3	Make a prediction about the volume of a container, the area of a figure, and the perimeter of a figure, then test the prediction using formulas or models.	M.C2.2		✖		Excellent for instruction. Very difficult to represent in CBA environment while maintaining the authenticity of the tasks.

*Rationale for HS only provided for EEs not included in the blueprint

EE	Description	Conceptual Area	Math 9	Math 10	Math 11	Rationale*
G-GPE.7	Find perimeter and area of squares and rectangles to solve real-world problems.	M.C2.2	4			
N-Q.1-3	Express quantities to the appropriate precision of measurement.	M.C3.1		3		
S-ID.1-2	Given data, construct a simple graph (table, line, pie, bar, or picture) and interpret the data.	M.C3.2		4		
S-ID.3	Interpret general trends on a graph or chart.	M.C3.2			3	
S-ID.4	Calculate the mean of a given data set (limit the number of data points to fewer than five).	M.C3.2		3		
A-CED.1	Create an equation involving one operation with one variable, and use it to solve a real-world problem.	M.C4.1		4		
A-CED.2-4	Solve one-step inequalities.	M.C4.1		3		
A-SSE.1	Identify an algebraic expression involving one arithmetic operation to represent a real-world problem.	M.C4.1	4			
A-SSE.3	Solve simple algebraic equations with one variable using multiplication and division.	M.C4.1	4			
A-REI.10-12	Interpret the meaning of a point on the graph of a line. *For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas.*	M.C4.2		4		
A-SSE.4	Determine the successive term in a geometric sequence given the common ratio.	M.C4.2			3	
F-BF.1	Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change.	M.C4.2		3		
F-BF.2	Determine an arithmetic sequence with whole numbers when provided a recursive rule.	M.C4.2			3	
F-IF.1-3	Use the concept of function to solve problems.	M.C4.2			4	

EE	Description	Conceptual Area	Math 9	Math 10	Math 11	Rationale*
F-IF.4-6	Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc.	M.C4.2			4	
F-LE.1-3	Model a simple linear function such as y=mx to show that these functions increase by equal amounts over equal intervals.	M.C4.2			3	